

Name: key Date: _____ Period: _____

Punnett Square Practice Worksheet

Ms. Ottolini, AP Biology

1. **Normal Monohybrid Cross:** In humans the allele for albinism is recessive to the allele for normal skin pigmentation. If two heterozygotes have children, what is the chance that a child will be albino? Give your answer as a decimal value

| | | |
|---|----|----|
| | A | a |
| A | AA | Aa |
| a | Aa | aa |

Answer: 0.25

2. **Normal Monohybrid Cross:** For the problem given above, if the child is normal, what is the chance that it is a carrier for the trait? Give your answer as a fraction.

Answer: 2/3

3. **Normal Monohybrid Cross:** In purple people eaters, one-horn is dominant and no horns is recessive. Show the cross of a purple people eater that is heterozygous for horns with a purple people eater that does not have horns. What is the chance that a child will be hornless? Give your answer as a %.

| | | |
|---|----|----|
| | H | h |
| h | Hh | hh |
| h | Hh | hh |

Answer: 50%

4. **Normal Monohybrid Cross:** In humans, the brown-eye (B) allele is dominant to the blue-eye allele (b). If two heterozygotes mate, what is the chance that a child will have blue eyes? Give your answer as a decimal.

| | | |
|---|----|----|
| | B | b |
| B | BB | Bb |
| b | Bb | bb |

Answer: 0.25

5. **Normal Monohybrid Cross:** In seals, the gene for the length of the whiskers has two alleles. The dominant allele (W) codes long whiskers & the recessive allele (w) codes for short whiskers. What percentage of offspring would be expected to have short whiskers from the cross of two long-whiskered seals, one that is homozygous dominant and one that is heterozygous?

| | | |
|---|----|----|
| | W | W |
| W | WW | WW |
| w | Ww | Ww |

Answer: 0%

6. **Normal Monohybrid Cross:** Eye color is controlled by two alleles, a dominant brown eye allele (B) and a recessive blue eye allele (b). A couple with brown eyes has a child with blue eyes. What is the probability that BOTH of their next two children will have blue eyes? Give your answer as a fraction.

Answer: 1/16

→ they must both be Bb

$$\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$$

7. **Dihybrid Cross:** In pea plants, the green color allele (G) is dominant over the yellow color allele (g) for seed color and the tall allele (T) is dominant over the short allele (t) for plant height. A parent who is homozygous dominant for color and short is crossed with a plant who is heterozygous for both traits. Determine the frequency for the four different phenotypes of the offspring in fractions.

↓ (top) GgTt (left side)

| | | | | |
|----|--------|--------|--------|--------|
| | Gt | Gt | Gt | Gt |
| GT | GGTt ✓ | GGTt ✓ | GGTt ✓ | GGTt ✓ |
| Gt | GgTt × | GgTt × | GgTt × | GgTt × |
| gT | GgTt ✓ | GgTt ✓ | GgTt ✓ | GgTt ✓ |
| gt | GgTt × | GgTt × | GgTt × | GgTt × |

Tall plant, green seeds:

$$8/16 \rightarrow 1/2$$

Tall plant, yellow seeds:

$$0/16$$

Short plant, green seeds:

$$8/16 \rightarrow 1/2$$

Short plant, yellow seeds:

$$0/16$$

8. **Dihybrid Cross:** In peas the trait for tall plants is dominant (T) and the trait for short plants is recessive (t). The trait for yellow seed color is dominant (Y) and the trait for green seed color is recessive (y). A cross between two plants results in 296 tall yellow seed plants and 104 tall green seed plants. What is a possible set of genotypes for the parents? (ex: ttYY x TtYy)

Answer: _____

→ about a 3:1 ratio of Dominant, Dominant & Dominant, Recessive

If all offspring are tall, the parent genotypes could be tt x TT, Tt x TT, or TT x TT

If 1/4 offspring have green seeds, the parent genotypes must be Yy x Yy

Yy x Yy

meaning the possible answers are...

① ttYy x TTYy ② TtYy x TTYy or ③ TTYy x TTYy

9. **Incomplete Dominance:** In radishes, the gene that controls color exhibits incomplete dominance. Pure-breeding red radishes crossed with pure-breeding white radishes make purple radishes. If you cross a purple radish with a white radish, what is the chance that the offspring will be white? Give your answer as a %.

RR

RW

WW

| | | |
|---|----|----|
| | R | W |
| W | RW | WW |
| W | RW | WW |

Answer: 50%

10. **Codominance:** In cattle, the alleles for red and white hair are codominant. Heterozygotes (individuals with one copy of the red allele and one copy of the white allele) have a mixture of red and white hair. Cattle with this color pattern are called "roan cattle." If two roan cattle are mated, what is the chance that the offspring will be roan? Give your answer as a decimal.

RW

| | | |
|---|----|----|
| | R | W |
| R | RR | RW |
| W | RW | WW |

Answer: 0.50

11. **Sex-Linkage:** The genes for hemophilia are located on the X chromosome. It is a recessive disorder. If a normal man marries a woman who is a carrier for hemophilia, what % of their children will have hemophilia, and what sex will they be?

X^h

| | | |
|----------------|-------------------------------|------------------|
| | X ^H | Y |
| X ^H | X ^H X ^H | X ^H Y |
| X ^h | X ^H X ^h | X ^h Y |

Answer: 25%, male

12. **Sex-Linkage:** For the problem given above, what fraction of their daughters will be carriers for hemophilia?

Answer: 1/2

13. **Sex-Linkage:** If a man and a woman who do not have hemophilia have a son with hemophilia, what must be true about the mother?

Answer: The mother must be a carrier for hemophilia